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ABSTRACT

This task group report is one of a series prepared by eminent psychologists who have served as consultants in the U.S.O.E.-sponsored grant study to conduct a Critical Appraisal of the Personality-emotions-Motivation Domain. In order to achieve the goal of identifying important problems and areas for new research and methodological issues related to them, an approach was followed in which leading investigators in specialized areas were enlisted as members of task groups and asked to reflect in their current knowledge of ongoing research and to identify the research needs in their respective areas. The titles of the articles in this volume are: Interests and Vocational Guidance (Campbell); Research Suggestions for Interest Test Interpretation (Sharf); Interests and Vocational Guidance (Harmon); and Interests and Vocational Guidance (Zytowski). (Author)

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NEEDED RESEARCH ON INTERESTS AND VOCATIONAL GUIDANCE

A SPECIAL REPORT OF THE USOE-SPONSORED GRANT STUDY: CRITICAL APPRAISAL OF RESEARCH IN THE PERSONALITY-EMOTIONS-MOTIVATION DOMAIN

Prepared by Task Group 4500 - Interests and Vocational Guidance
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Under the Editorship of S. B. Sells
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FOREWORD

The task group report presented in the following pages is one of a series prepared by eminent psychologists who have served as consultants in the U. S. Office of Education sponsored grant study to conduct a Critical Appraisal of the Personality-Emotions-Motivation Domain. The study was planned with the advice of an advisory committee including Professors Raymond B. Cattell and J. McV. Hunt (University of Illinois), Donald W. MacKinnon (University of California, Berkeley), Warren T. Norman (University of Michigan), and Dr. Robert H. Beezer (USOE) and follows a topical outline included as an appendix to the present report. In order to achieve the goal of identifying important problems and areas for new research and methodological issues related to them, an approach was followed in which leading investigators in specialized areas were enlisted as members of task groups and asked to reflect on their current knowledge of ongoing research and to identify the research needs in their respective areas. The general plan is to publish these reports as a collection with integration contributed by the editors. It is hoped that these reports will prove to be valuable to research scientists and administrators.

S. B. Sells, Ph.D.
Principal Investigator

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I. Interests and Vocational Guidance

David P. Campbell

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This is an overview of some of the current activities and problems of vocational interest measurement. Three areas are stressed: theory, technology, and application.

I. THEORY

Empiricism as History. Historically, vocational interest measurement has been almost anti-theoretical. It established itself as a field of inquiry because interest inventories are practically useful, and practitioners and researchers in this area have had a healthy suspicion of any elaborate theoretical structure that wasn't of immediate practical use. The techniques employed have been resolutely empirical, generally with favorable results; the scoring scales that have been developed to measure the individual's interests against those of people in specified occupations provide about the only "hard" data that psychologists have available to present to an individual to help him or her choose which direction to go in life, a decision which is so central to the person's life and so universal among all individuals that any possible useful information is eagerly studied.

Empiricism has dominated the field; whatever worked has been used whether or not it had any theoretical underpinnings and whether or not the user understood just how it worked. However, this empiricism which has been so useful has also kept the field in a retarded state of development. The techniques that have worked best -- that of developing scales for specific occupations -- provide useful information for the individual but add relatively little to our understanding of interests or occupations per se. To continue to build occupational scales with no regard for the underlying theoretical structure is to

continue the psychology of the 1930's. Useful though these techniques may be, this approach offers little hope of any breakthrough that will help us understand just why what we are doing works; only by understanding the underlying phenomena can we further extend the usefulness of the study of interests.

Holland's Theory. The current work of John Holland of Johns Hopkins University provides a potential breakthrough. Holland, working from both his own data and the results of many other investigators, has developed an occupational classification scheme which is a satisfying fit with the empirical data of vocational interests. His classification system, which is deceptively simple, meshes well with the earlier empirical results from other investigators, notably E. K. Strong and J. P. Guilford, and provides a theoretical extension which opens up many new areas for study.

The basic premise of Holland's system is that there are six basic occupational types. These differ markedly in their occupational orientations, not only in their interests but also more generally in their attitudes, aspirations, competencies -- indeed, in their entire psychological makeups. Holland would argue -- and I would agree -- that the occupational personality is the personality.

Holland's six types are the following:

> REALISTIC -- People of this type are usually physically strong, and frequently agressive in outlook; they usually have good physical coordination and skills, but have trouble expressing themselves in words, and in communicating their feelings to others. Such people prefer to solve specific practical problems dealing with things, rather than abstract problems dealing with ideas, or social problems dealing with people. People of this type usually have conventional political and economic values, and they frequently aren't comfortable around new ideas about how the world should be run. They prefer occupations such as mechanic, construction work, fish and wildlife management, some engineering specialties, military jobs, agriculture, and the skilled trades.

INVESTIGATIVE -- This type is interested in science, very task-oriented and asocial, they enjoy solving problems, and have a great need to understand the physical world. Such people enjoy ambiguous tasks, and do not like highly structured situations with lots of rules; they would rather think through problems than act them out. They frequently have unconventional values and attitudes about the world. Their occupational preferences include design engineer, biologist, social scientist, research laboratory worker, physicist, technical writer, and meteorologist.

ARTISTIC -- The model type here is asocial and likes to work in artistic settings; they avoid problems that are highly structured or require gross physical strength. The Artistic type resembles the Investigative type in avoiding relationships with people and preferring to work alone, but the Artistic type has a greater need for individualistic expression, is usually less confident of his own opinions and capabilities, and suffers more emotional distress. The Artistic type prefers dealing with problems through self-expression in artistic media. Vocational choices include artist, author, cartoonist, composer, singer, drmatic coach, poet, actor or actress, or symphony conductor.

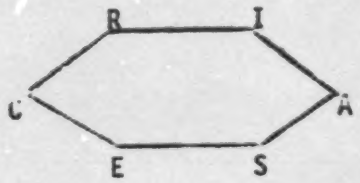
SOCIAL -- People scoring high here are sociable, responsible, and humanistic. They usually express themselves well, and get along well with others; they like attention and seek situations allowing them to be at or near the center of the group. They prefer to solve problems by discussions with others, or by arranging or rearranging relationships between others; they avoid intellectual problem solving, and problems requiring physical activity or highly ordered schedules. They prefer occupations such as school superintendent, clinical psychologist, high school teacher, marriage counselor, playground director, speech therapist, and vocational counselor.

ENTERPRISING -- These people are salesman, with good verbal skills for selling, dominating and leading; they see themselves as strong and dominant, and prefer ambiguous social tasks where they can assume leadership. They enjoy persuading others to their viewpoint. They do not like precise work, nor work involving long periods of intellectual effort. They have considerable concern for power, status and material wealth. Vocational preferences include business executive, buyer, hotel manager, industrial relations consultant, political campaigner, realtor, many kinds of sales work, sports promoter, and television producer.

CONVENTIONAL -- The Conventional type prefers highly ordered activities, both verbal and numerical, and is

> more comfortable in a subordinate role, working in a well-established chain of command. They dislike ambiguous situations, and like to know precisely what is expected of them. They are most effective at well structured tasks and usually avoid problems requiring intense interpersonal relationships or physical skills. They identify with power, and value material possessions and status. Vocational preferences are mostly within the traditional business world, and include bank examiner, bank teller, bookkeeper, some accounting jobs, financial analyst, computer operator or programmer, inventory controller, tax expert, statistician, and traffic manager.

These six types, identified by their initials -- R, I, A, S, E, C -- can be arranged in a hexagon, with the most similar types next to each other and the most dissimilar across the diagonals.



Obviously, the fantastic diversity of people cannot be handled in six categories, and Holland has recognized this by establishing subcategories within each of the six basic patterns -- types within types. Thus, the Realistic cluster is broken down into many two-letter codes, such as Realistic-Investigative (RI), Realistic Artistic (RA), or even three letter codes, such as Realistic-Investigative-Artistic (RIA). These categories, which in the extreme could number as many as 30 (6 X 5) provide more diversity to handle the wide array of human differences in interests.

One of the major benefits of the Holland system is that the vast empirical archives of data collected with the SVIB, first, by E. K. Strong at Stanford, and then by his successors at the University of Minnesota, can be organized fairly well into the Holland six types. Several of the occupational groups

on the SVIB profile are directly translatable into a Holland type, and the others can be arranged to make sense. This compatability between the two systems is an enormous benefit, for the merger provides both the explanatory benefits of the theory, and the solid security of the empirical data.

A second major advantage of the development of the Holland system is that it provides some tools for the study of other issues within this field. The empirical occupational scales are too cumbersome for many research purposes; the provision of these six basic types, which can be thought of as six basic dimensions, will allow more progress in such areas, especially as the results can quickly be integrated with earlier work via the Holland theory and Strong data.

There are some problems in the Holland theory. First, some occupations do not classify well; lawyers, for example, don't fit any of the types very well. Second, the types have different band widths; the Realistic type, for example, covers a much wider range, both in terms of personality characteristics and percent of the population found within it; than does the Conventional type, which means that it is more often necessary to invoke the sub-clusters of the Realistic type compared to the Conventional type. Third, the classification system works much better with men than with women; whether this is because women need a different classification scheme, or because the psychometric devices are mainly tuned for males, or because women do hot have the wide diversity of occupational outlooks found in men, is not clear. Fourth, some people do not classify well; some show similarities with all six types, some with none. This is likely a technical problem of learning how to develop better classification scales.

Future research will undoubtedly provide some useful answers to all of

these problems.

II. TECHNOLOGY

The technology of interest measurement has focused historically on the problem of sample selection, scale construction, and determination of validity. This emphasis was necessary as all of these factors are of basic importance in the development of inventories that actually work. Now that we know effective inventories can be developed, we need to pay attention to other issues.

Three important current issues are: 1) itemmetrics -- the study of the characteristics of individual items; 2) norming -- the establishment of base rates; 3) presenting results -- mostly a graphic problem.

Itemmetrics. The measurement of vocational interests has been almost entirely a blind, empirical endeavor. Scales have been developed simply by identifying specific items that show empirical differences between occupational samples and a general population sample, then using these items as the components of scoring scales. The resulting scales are valid, just how valid depends on what indices one uses, and reliable; test-retest correlations over short time periods are almost always above .85 and usually above .90. Yet we do not understand very well how or why these scales work. With advances in "itemmetrics" -- the quantification of the characteristics of individual items -- the collective impact of responses to psychological test items is becoming better understood, which should lead to better scales, and more useful applications.

In the past, the only characteristic of items that has been quantified has been some measure of validity, such as a correlation with an outside criterion or difference between two samples. Some examples of recently

developed itemmetric measures are 1) the intercorrelations between items -- useful for clustering them into homogeneous scales -- and 2) the standard deviation of the distributions of item responses over hundreds of samples -- useful for determining which items are most powerful in eliciting differences between groupds.

Other areas where new measures need to be developed are:

1. Indices of item content

Items can be organized into content categories fairly well by inspection, and somewhat more precisely by correlational techniques, but even more precise methods are needed and can probably be developed. For example, the item Architect belongs in both the artistic and scientific areas, and the item intercorrelations reflect this. What is needed now is some method to attach a number to the degree of "artisticness" and "scientificness" of the item, numbers that can somehow be added up across items for a total score.

2. Degree of item predictive power

Even good items differ in a variety of ways from each other. One important way is the degree of predictive versus concurrent validity. Because interest inventories are developed using concurrent indices, then applied in settings where predictive indices are wanted, researchers must be careful not to use items that have concurrent but not predictive accuracy. For example, the item, I like to perform scientific experiments shows high endorsement rates among both budding, and working scientists, and consequently has both good predictive and concurrent validity. At the other extreme, the item I am a scientist, has excellent concurrent validity but zero predictive validity. Such items should not be used in tests and inventories.

3. Overall populatity

Some items of similar content vary considerably in level of popularity. For example, the item Be a scientific research worker is correlated with the item Be a laboratory technician, yet the level of endorsement of the first item is much higher than the second. To fully describe all of the differences between the two items, some parameter of general popularity is necessary.

Items are the basic building blocks of interest inventories; to improve the latter, we must learn much more about the former.

Norming or census taking of interest patterns. The concept of "Norms" is as old as psychological measurement itself. Until now, norms have been used almost exclusively to provide rank-order data about individuals, as opposed to being used as data worthy in their own right. We should begin learning how to do this interest measurement. As a beginning, we should learn how to collect census-type data on interest patterns. Again, the Holland types could be used as a starting place. These different types seek out, and create, different occupational environments, and the relative abundance or scarcity of the different types undoubtedly has some impact on the type of society in which they live. A society filled with Realistic types will have different social structures than one dominated by Social types; a society filled with Enterprising types will likely have a different pattern of consumption than a society filled with Artistic types.

Some research should be conducted to substantiate those conslusions; the first step would be to try to determine the percentages of tne various types in various environments -- a census, so to speak, of occupational interest types.

Once the necessary techniques were developed for census taking, then these techniques could be used to study differences between a wide variety of groups, such as different age levels, or various institutions.

Learning how to present results to individuals. Another area of current concern is specifically how to present the results from interest inventories, that is, in interviews or in group settings or perhaps by mail. Historically, psychologists have taken the position that interest profiles should be given to people only in counseling settings, or at least with some kind of professional interpretation in person, and any attempt to make the inventories more available, as by mail, is usually viewed with great skepticism. The possibility of misinterpetation is considered so great, and the impact of this misinterpretation so devatating, that more harm than good will be done.

This position is a weak one, and it is eroding further. Students and others are becoming less docile about filling in tests and inventories and then not being able to see their results, and there is a clear legal movement towards making all information collected and filed about a student available to the student and his/her family. Further, professionals are realizing that the manpower needed to provide everyone with a professional interpretation is not now, and will never be available. Consequently, there is more concern now for providing test results back directly to the person in ways that will not be vulnerable to misinterpretation.

This trend will probably continue in two distinct directions in the future, and both of them merit further research. The first will be the development of simpler instruments, immediately hand-scorable by the subject, with detailed instructions as to how to use the results for finding further

information. The other approach will be to utilize further the enormous capacity of the computer to develop even more intricate scoring techniques, but techniques that result in readily understandable output, suitable for the layman. Some of the developments with the Strong are going in this direction, and the computer-interpreted scoring for the MMPI has gone even further (though the latter output is still oriented to professionals.)

The intent is to give the individual as much solid, easily understandable information about himself/herself as possible. Several strategies could be adopted, each leading to different specific techniques. At the moment, no hard information is available to help select among these strategies: much research needs doing.

III. APPLICATIONS

One of the problems in planning the future progress of research in interest measurement is that there has been no specified statement of the objectives, specifically of the uses of interest inventories. In the past, researchers have simply tried to develop inventories "to measure interests" with little thought being given to how they would be used. As different uses require different features, we must now give considerable thought to the uses before proceeding further. For this purpose, the following list of current and potential applications is included here.

Current Applications.

1. As an aid for the individual faced with curricular or occupational choice.

This is by far the most common use. Test scores are given to students to show them their similarities with various occupational types and they use this information to help them in their planning. Most of the past research

and development has concentrated on this application.

2. As a vehicle in discussions between student and counselor.

Many students who are seeking vocational guidance feel more comfortable with some initial structure in the discussion. Test scores provide a focus that moves the conversation quickly to areas of greatest concern to the student. Many counselors, especially inexperienced ones, also appreciate the focusing qualities of the profile scores. Tests should not be used as a crutch, but that is seldom a problem after the counselor accumulates some experience.

3. As a useful aid in discussion between student and parents.

While experienced teachers and counselors can adroitly open up guidance discussions with a student, many parents do not have the same facility. Again, interest test scores can provide a framework around which conversations can flow on topics such as career choice and personal development. Through these test scores, the parent is given specific information about the interests of the child -- information that may never have surfaced in their earlier discussions -- and the student has an opportunity to explain himself/herself in ways not usually possible.

4. As a selection device in the hands of those who have to make employment decisions.

Precisely how test scores should be used in selection will vary with the situation and the training of the individual doing the hiring. Employment decisions are very important ones, and they should be made by people with some professional training. Simply using the inventory as a "GO-NO GO" selection device, and making each decision on the basis of a rigid cutting score on an individual scale is not recommended, though such a strategy is probably better than a seat-of-the-pants decision based on whether the

applicant is friendly and has a good handshake.

5. As a guide to help someone plan their self-development.

A young man with some ambitious career goal, say engineering school, may find that his score on the Engineer scale is low, indicating that his interests do not correspond very closely with employed engineers. Inspection of his scores on the Basic Interest Scales may show that his interests in specific areas such as mathematics and science are lower than the average engineer. Once this is pointed out, assuming that he is serious in pursuing engineering, he may decide to concentrate on math and science in the hopes of stimulating some greater interest in these areas. There is, as yet, no empirical evidence to support the efficacy of such an approach, but surely an individual who is highly motivated doesn't have to abandon himself to his interest profile.

6. As an aid in helping people understand their job dissatisfaction.

Some people are dissatisfied with their jobs because they are in positions that do not allow them any outlet for their dominant interests, or -- a related reason -- they are in settings where they have little in common with their colleagues. Many times an interest profile can identify the problem by showing the individual how he or she is different. When a female accountant is shown that her interests are much more artistic than most businessmen, she has some information that can help her deal with the boredom of her job. Even if she cannot change careers, she can take steps to improve her lot, perhaps by becoming active in the local art institute during off-hours or by seeking employment as an accountant in some art-related company, such as an advertising agency. What she does depends on her imagination and energy, but the inventory can give her some direction.

Research Applications.

The above list covers most of the day-to-day practical applications of interest inventories; the following section suggests potential uses by researchers.

1. To study the characteristic interests of individual occupations.

By studying information such as item response percentages, or patterns of scale means for an occupational sample, or intercorrelations of a new scale with existing scales, much can be learned about the dominant interests of the people in a specific occupation. As an example, the interest inventory data from the sample of women Army non-commissioned officers showed that their likes were concentrated in the administrative and clerical fields with an emphasis on office management; their aversions, when compared with other women, focused on the traditional home and family activities, that is, they reported much more distaste than the average women for running a home and raising a family. Such information is very useful in informing students about occupations, and the more occupations so studied, the better.

2. To study change in groups.

Interest inventories have been used to test groups at one point in time, and then to retest them later to see how they have changed. An example was the study by the American Association of Medical Colleges in which 2800 medical school students were tested as entering freshmen and retested four years later upon graduation. The results indicated that these students showed a decline on scientific and social service interests, where they had scored very high as freshman, and a mild increase in adventuresome interests during medical school.

Interest inventories are not especially good for detecting small,

subtle changes in groups. Because the items for the inventory have been selected for long term stability, small day-to-day shifts do not show up in the scores. Teachers who wish to test students before and after a specific course to determine what impact the course had will usually find that interest inventories show little, if any, change. Most people's interests are quite stable over the short range, no matter what experiences they are exposed to, so that interest tests are not good instruments for such purposes.

Over a longer period of time, say 2 or 3 years, substantial changes do occur in some people as a result of some experiences and inventory scores should reflect those, assuming that the changes are occurring in the area of interests.

3. To study change over time in institutions.

Interest inventories can be used to compare different classes or different pools of applicants or different recruit classes or volunteers at various times. An example of this was the study of the characteristics of freshman classes at Dartmouth College over a twenty-year period. These results showed that the more recent classes were much more academically oriented -- with stronger interests in science and the arts -- than their predecessors who were more attracted to business endeavors.

4. To study general societal trends.

By comparing samples tested in the 1930's with comparable samples tested in the 1960's, some estimate of general changes within our society can be drawn. The results of such studies showed that there is much more stability in vocational interest patterns over long time spans than the average layman thinks. However, one general shift has occurred and that has been a mild increase in extroverted interests. People today

report more attraction for working with others in a variety of settings than did men and women in comparable occupations who were tested in the 1930's.

5. To study change within a single person.

Interest inventories can be used in case studies to study change over time within a single person. Such studies are particularly useful in keeping us aware that we are dealing with real, warm people, not just statistics.

6. To study cross-cultural influences.

Several projects have used interest inventories to study occupations in other countries. Examples of these studies include Lonner's work with German speaking psychologists and accountants, Shah's work with Pakistanian physicians and engineers, Hanlon's study of Irish students, and Stauffer's work on the German and French translation.

The results of these studies show great similarity of interests among people in the same occupation across several countries, and generally American norms are useable in other countries to represent the interests of the specific occupations.

Some Potential Research Uses.

The brief list above covers most of the usual research applications of interest inventories. Other applications are possible, especially with the improvements being made in the instruments, and some of these should become more common. Here are some likely possibilities.

1. To identify homogeneous types on which to do further research.

Dimensions of interests can be used in the same way that we have learned to use measures of general intelligence, or socio-economic status.

The Holland General Occupational Types scales are a prime possibility. People can be grouped into Realistic types, Artistic types, Social types, and so forth as a prelude to other investigations. Almost certainly, these occupational types will act differently in various environments, and researchers could use this typology as a classifying variable. For example, investigators studying the reactions of individuals to crowding might first separate their subjects into Social and Artistic groups, as these groups will likely have differing reactions to crowds of people.

2. To help understand the influences on career development.

Strange as it may seem, we have almost no knowledge about how various patterns of interest -- scientific or artistic or sales -- develop. Virtually all of the research thus far has concentrated on the technology of measuring the interests, or on describing group characteristics, or on determining the degree of predictability of individuals, or on studying other correlates of interests. Little has been done in studying how the different patterns of interest are formed initially. To a large extent, this is because the measuring instruments have not lent themselves to this type of research. The sheer empiricism of the traditional approaches restricted the range of applicability of the inventories, and there was no easy way to study early determinants of various patterns of scores. Now that the profile has a more difinite theoretical orientation, this theory can be used to organize further research.

3. To carry out a census of interest patterns.

How many people in a given society have scientific interests? How many have artistic interests? Are cultures with many Enterprising individuals more progressive than cultures with few? Interest inventories can help

research such questions.

4. To study interpersonal relationships.

Marriages between people of similar interests might be more successful than others. Fathers and sons with different patterns of interest might need more help in communicating with each other than would others. Groups composed of heterogeneous interest patterns might be more or less efficient than homogeneous groups. The characteristics of the individuals within the group surely have some impact on the overall group behavior, and interest inventories can help in studying such issues.

5. To modify working environments.

The study of interests has been useful thus far mainly for helping a person find a satisfying occupational environment. A major extension of the use of these data could be to modify existing environments so that they match more closely the characteristics of the individuals. We do not yet know enough to know how this should be done on any broad scale, but an obvious example can be cited as stimulation for further thought, i.e., psychologists report considerable interest in artistic activities; consequently, a few works of art spread around their working environment would be pleasing to them.

More extensive applications of this approach will require more creativity, and more definite breaks with tradition. For example, women in low level jobs, such as factory assembly work and telephone operators (where the level of job satisfaction is low compared with other jobs) report strong attraction for working with children, more so than women in other settings. With some imagination, perhaps children could be made part of their occupational

world. One way would be to run a nursery for the children of the work force, and give each woman a two-hour shift each day in the nursery. Another way would be for a company to offer a special program for children -- say, a remedial program for retarded readers. Each day several children could be brought to the company location to spend an hour or so being read to by a woman who had been given released time for that purpose. Very likely, a woman give that responsibility would look forward to those hours as the highlight of her week.

There are many practical problems to be solved, but the point is that such programs, tailored to the measured interests of the employees, could provide them with more occupational satisfaction and at the same time take care of a societal problem.

II. Research Suggestions for Interest Test Interpretation

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Every counseling psychologist has, at one time in his career, interpreted a test to a client; yet many important questions about the interpretation of tests have remained unanswered. This paper outlines some of these questions and proposes possible solutions to them. Although test-interpretation has been conceptualized and researched from various viewpoints, an organized approach to finding answers has been lacking. Currently, several issues are present in test interpretation. These include problems of conveying complex statistical information to clients and the difficulties of integrating test reports into the process of making vocational decisions. To ascertain which methods of test interpretation would be most effective in eliminating these difficulties and in communicating clear information to the client, two important research variables should be explored. First, the subject variable must be defined by being explicit about sex, age, socioeconomic status, and individual differences of clients. Second, methods of controlling treatment variables, such as counselor behavior in interpretation sessions and means of presenting test results to clients, are necessary. Recently, many new ways of giving the client information about his test scores have been developed. Yet without adequate criteria, the efficacy of these methods, which have far-reaching implications for counseling, can never be evaluated. By investigating this area of counseling, which Campbell (1969) and Goldman (1972) have described as being woefully neglected, many questions can be answered.

From a broad perspective, style of communication of test results ranges, on a continuum, from counselor- to client-based interpretation. The interpretation that a counselor uses himself is rarely the same interpretation that he makes to the client. Thus, a counselor who administers the Rorschach, drawing many hypotheses and inferences from it about the client's personality and inner dynamics, will rarely verbalize these to the client in other than a guarded and simplified manner. Levy (1963) describes counselor interpretations of this type in detail. In contrast, some tests, such as interest inventories, are designed to facilitate the client's understanding of his own test scores. Several types of tests are arranged below on a continuum illustrating the counselor-client interpretation dimension. Although there is great overlap in the way tests are used by individual counselors, the generalizations indicated by the diagram may provide a useful system of categorization. As shown in the illustration, it is interest tests which emphasize client understanding of test results. This paper will focus both on interest tests and on methods of aiding the client in the utilization of test scores

Personality Tests	Attitude Tests	Tests of Intelligence	Aptitude and Achievement Tests	Interest Inventories
Interpretation Primarily for counselor's use				Interpretation Primarily for client use

In the past two decades, research has focused on determining the superiority of one method of interpreting tests over another. The means of interpretation have included mailed interpretation, programmed instruction, and several varieties of group and individual counseling. Not only are

there many ways of imparting test information, but there are many means of evaluating the effectiveness of the test interpretation method.

Some studies have examined the relative effectiveness of individual, small group, and written reports (Folds and Gazda, 1966; Hills and Williams, 1965). All methods were found to be equally effective, excepting that Hills and Williams (1965) found handwritten reports to be less effective than other methods in recall of test information. Many researchers have found degree of counselor client interaction to have relatively little effect on various counseling criteria: Dressel and Matteson (1950), Holmes (1964), Rogers (1954), Lane (1952), Adamek (1961), Berdie (1954), and Seaquist (1970). However, Johnson (1953) and Holthouse (1970) did find some positive changes in self-concept with individual counseling. In general, research on test interpretation has failed to find consistent differences between methods of test interpretation using various criteria.

Difficulties in Interpretation of Interest Inventories

The statistical complexity of interest inventories varies from test to test. However, the problem of explaining any statistical term to a client is an unnecessary complication that interferes with the client's understanding of test material. Standard scores are difficult to explain because they require explanation of the concept of a standard deviation as well as a brief introduction to the philosophy of measurement. Even harder to comprehend is the Lambda coefficient. This measure reported on the Kuder Occupational Interest Survey (KOIS) is extremely complex--a ratio of correlation coefficients. If this concept is not easily understood even by most counselors, how can the client be expected to understand a statistic like the Lambda coefficient?

Even percentiles cause confusion. Often the norm group to which an individual is being contrasted is unknown or forgotten. Thus, the student who says, "I did better than 99% of the others" may not know or may have forgotten what "others" means. Another frequent misunderstanding caused by the use of percentiles is that of the student in the 90th percentile of his class who may say that 90 out of 100 students scored better than he on his test, rather than 10 out of 100. Although these score conversions avoid some of the problems of raw scores, the fact that they are transformations may cause confusion to the student. Therefore, methods of communication of test results must be able to present accurate information to the client in a manner that does not distract from the purpose of using tests in counseling.

The concepts of validity and reliability are important in selecting tests, but for the client they are too complex to be useful. The counselor needs only to provide a brief description of the limitations of test results to the client. However, skillfulness in communication of this idea is essential if tests are not to be misused.

Adding to the complexity of interest inventories is the fact that many have large numbers of scales. Two of the most popular, the Strong Vocational Interest Blank (SVIB) and the KOIS, have over 70 scales. In addition, the SVIB has several types of scales: basic interest, occupational, and non-occupational scales. This plethora of information must be presented in a clear and meaningful way--often a difficult task for a counselor. Other inventories such as the Ohio Vocational Interest Survey (OVIS) and the Holland Vocational Preference Inventory (HVPI) avoid the problem of too many scales by their use of a theoretical understanding of vocational

choice. Because of their breadth, theoretical constructs tend to provide a much fewer number of categories. However, before a client can effectively use the results of such tests to develop a vocational plan, a brief explanation of the theory is helpful.

Interest inventories are used most frequently as aids to career exploration. As such, they must fit well with theories of the world of work. An interest inventory which does not stimulate exploration of occupational information is often of little value. The counselor must be able to provide a link between the tests and career information. The test interpretation must aid in the selection of occupational pamphlets, books, work tasks, and job experiences. A test of preferences cannot operate in isolation from the individual or the information he needs to facilitate his vocational development.

Subject Variables

Most of the research discussed previously treats clients as one homogeneous group. Almost all of the studies have used college students as subjects; little is known about effective methods of test interpretation for different groups of clients. However, there may be different interpretive methods for different groups of clients. For example, the women's liberation movement has stressed the point that the counselor must be alert to occupational sex biases. A proper test interpretation for women must emphasize the availability of many occupations, not stopping at traditional occupations such as nursing and teaching. Another variable that has been overlooked is that of age. Certainly, methods of test interpretation for ten-year-olds will not be the same as those for junior high school students, college students, or mature adults seeking a new career. Investigators must limit the

applicability of their results to the characteristics of their client population when measuring the effectiveness of varying test interpretations.

Minority groups have often raised the issue that tests discriminate against them. While referring mainly to tests of ability, such comments have applicability to the interpretation of other tests. Not only must the counselor be alert to racial biases in a counseling situation, but he must also be aware that the client may have feelings, such as a fear of testing, which may lead him to discount meaningful results. Blacks, Indians, and Spanish-speaking people may have varied expectations regarding counseling. To expect that all groups and members of those groups will respond to a specific method of test interpretation in identical ways is an untested assumption which requires research.

While group differences in response to test stimuli are important, individual differences require attention as well. Some clients may relate easily to a counselor, whereas others may not. Does a counselor discuss test results with a verbal client in the same way that he does with a non-verbal client? Some clients may depend heavily on test scores, while others may feel that scores are meaningless. How does a counselor effectively interpret test results to these different individuals? Some clients may have an unrealistic vocational choice; others may be totally undecided in their choice. What interpretive and counseling methods are appropriate here? In general, group and individual differences have been ignored in most research on the effectiveness of test interpretations. Figure 1 includes these variables in a comprehensive paradigm which suggest areas of research yet to be developed.

Type of Test Interpretation

Client Variables	Standard Profile Interpretation	Programmed Interpretation	Audio-video Interpretation	Computerized Interpretation
Sex				
Age				
Education Level				
Cultural Group				
Personality Type				
Type of Vocational Problem				

Figure 1. A design suggesting future directions in research in test interpretation.

Treatment Variables

The more precisely behaviors in a test interpretation session are described, the more closely the treatment variable is defined. Thus, counselor behavior in an interview must be measured and/or controlled by the investigator. Failure to do this may account for finding, as did Holmes (1964), no differences among treatment conditions, but significant differences between counselors across treatments. Counselor behavior, such as style of communication, may account for these differences.

One type of analysis that has not been widely used in studies of effectiveness of interest inventory interpretation is content analysis. If an investigator could determine an effective theoretical or empirical model for interpretation, test interpretation sessions could be then analyzed to learn which form of test presentation is most effective with which type of client and client problem. This model may be particularly effective in evaluating new ways to teach interpretation methods to beginning counselors.

Kiesler (1966), when describing problems in research in psychotherapy, outlines variables affecting the treatment condition in detail. Analogous problems are found in the test interpretation session. An advantage in researching test interpretation over psychotherapy is that there are some very specific means of controlling test interpretation which are more manageable than in more general counseling or psychotherapy research. One variable that can be controlled in vocational counseling is that of the presentation of test results to the client.

Several methods of communicating information about tests exist: profiles with and without written information, programmed instruction, audio- or video-taped explanation, and computerized narrative explanation (see

III. Interests and Vocational Guidance

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Restatement of the Task

My goal in this paper is to explore interest measurement and its relationship to career counseling with an orientation toward the future and a knowledge of the past.

Goal of Research in the Area

The goal of researchers in this realm is to understand and measure interests in a way that is useful in vocational counseling with and for individuals.

Current Status of Research in the Area

Perhaps the proliferation of interest measures (Buros, 1972) is an indication of the uncertainty adults in our society feel in planning their lives.

Most researchers in interest measurement assume that there is some underlying typology of interests (Strong, 1943; Roe, 1956; Holland, 1966). In fact, a first step has been made toward bringing the typology of Holland into agreement with the measurement of the Strong Vocational Interest Blank (Campbell, 1972, Appendix E). However, an individual may still score differently on like named scales on two or more inventories (Johnson, 1971; King, Norell, & Power, 1963; Zytowski, 1968) or even on like named scales on subsequent forms of the same inventory (Johnson, 1969). Thus, even the best of the interest inventories reflect the underlying typology of interests imperfectly as discussed by Zytowski (1968). The clinician and his client are justified in questioning the usefulness of interest measurement. Cole

(1972) has advocated that since the measurement of women's interests is lagging behind rather speedy cultural change in opportunities for women, interest inventories should serve as guides to point the individual to her location in vocational space as described by Holland, Whitney, Cole, & Richards, 1969. Her solution, if applied to the problem of interpreting occupational scales, would signal a dependence on homogeneous scales (Clark, 1961; Campbell, 1972) which are not derived by studying occupational group members, until the problems are solved.

Research Needed to Advance the Area

The foregoing suggests that there are pressing problems in the area of applying interest measurement to actual practice. One obvious need is to show that the use of interest measures in career counseling increases the efficiency of career counseling. Although at least one interest inventory has been shown to be predictive of future vocational behavior (Strong, 1955), there is no evidence that early knowledge of the results of interest inventories helps individuals make "good choices" in any sense. This seems to be a prerequisite to an acceptance of interest measurement by any rational practicing counselor.

On the other hand, some factors related to the use of interest inventories by practitioners are not so rational. The kinds of people who pursue careers in counseling can probably artificially be dichotomized into two extreme types. Those who need to know the answers will use interest measures to supply them and those who approach their clients humanistically, fearful of any outside influence acting on the client's freedom of choice, will not use interest measures at all. We need to develop instruments or procedures which reliably identify these two extremes. Then we need

to experiment with teaching methods which will help each type move to a more moderate middle ground where the client's integrity is respected but where useful outside influences, including interest measurement, are utilized. Some possible teaching methods are role modeling by instructors, reinforcement of appropriate behaviors on a more immediate schedule than that provided by the graduate school grading timetable, and intensive interpersonal process recall experiences (Kagan & Schauble, 1969). Each of these treatments is the occasion for a study of attitude change in the counselor. As a secondary step, the counselor's use of interest measures in counseling should be investigated. Other counselor attitudes which may effect their use of interest inventories in counseling and which may be amenable to experimental manipulation include fear of mathematics, and tolerance for ambiguity. Only when these attitudes have been changed can the provision of correct technical information regarding interest measurement have any effect. At that point it will be appropriate to study methods of imparting technical material to counselors in training.

On the more technical side, research is needed on the specific sources of variance in each reputable interest inventory, especially those using empirically derived occupational scales, so that we can explain the differences between them and resolve the differences in the direction of better service to clients. This could be accomplished by holding subjects constant (Zytowski, 1972; Johnson, 1971) and administering several inventories while exploring item and scale statistics. Semantic expertise would probably be needed to explain some item differences.

Alternatively, one might expand on the suggestion of Cole (1972) and take the position that an interest inventory is only a guide to vocational

position. Many of the newer inventories (DeCosta, et al., 1968; Hall, 1968) seem to rest on the assumption that an inventory is just a guide to discussion and that predictive validity is rather immaterial. Goldman (1972) raised this point in discussing the problem of translating the triumphs of measurement to counseling tools. This writer would prefer to have anything that looks as precise as an inventory scale score looks, grounded in some kind of predictive validity. But again, the question can be solved empirically by counseling two groups of students with the best of the two types of inventories (predictive and discussion promoting) and comparing the results assuming that some criterion, such as satisfactory employment, can be agreed upon. One gets the feeling that the proponents of the two approaches might have trouble selecting a mutually agreeable criterion, however.

If we can assume that there is an underlying typology of interests and leave off our concern with description, some extremely interesting research problems arise.

It seems possible to get into an experimental frame of mind and ask what kinds of treatments change interests. This kind of question should lead to information about the development of interests. Treatments which may effect the development or change of interests include socioeconomic status, role models, reinforcement schedules, specific experiences, and economic conditions involving supply and demand for various types of work. It is possible that these treatments are differentially efficacious in changing or developing interests over the life span of the individual. As an example, women are experiencing increasing opportunities in the job market thanks to the efforts of modern feminists. Most people have assumed

that women as a class do not want these greater opportunities and will not utilize them. They assume that most women will continue to be interested in nursing, teaching, social work, secretarial work, and homemaking rather than business, engineering, and theoretical sciences. It seems reasonable to ask if one can change the interests of a group of sixteen year old girls, all interested in social work, by reinforcing experiences and exploration in sciences, skilled trades, and business, for example. One might also test whether the reading materials supplied to 7-year-old females, influence their thinking about their vocational potential, as alleged by feminists, by supplying controlled treatment materials to two randomly assigned groups.

A related problem is whether the traditional patterning of interests (Strong, 1943; Roe, 1956; Holland, 1966) can be altered experimentally. We tend to assume that certain kinds of interests always go together, for instance, math and science interests. Perhaps some treatments would change the traditional clustering so that, for instance, math is more closely related to artistic interests, and science more closely related to business interests than to each other in individuals. The result might alter the organization of the world of work, as well as the pattern of technological advance in our society.

Information regarding the patterning of interests in other cultures would shed some light on the question of whether the traditional patterning of interests can be varied experimentally. Shah (1970) and Lonner (1967) have found that similar interests emerge in other cultures, but they both studied specific professional level vocational groups.

Theoretical Problems

The greatest problems in applying experimental treatments to human beings are ethical and philosophical. Obviously, there can be objections to attempting to change the vocational orientation of a group of human beings. For instance, our group of sixteen year old would-be social workers and their parents may be perfectly happy with their plans. To change their interests to those of people who enter scientific, technical, or business occupations may involve them in less conventional, more conflict laden lives. Who should decide what changes are desirable?

There are those even among counselors who are philosophically opposed to any attempt to manipulate or even predict vocational behavior. A more moderate approach, which stresses the fact that all behavior is controlled and also stresses the desirability of replacing some of the current controls, such as poverty and ignorance, with more positive controls, is more facilitative of important research in interest measurement.

Technical Problems

To understand the development of vocational interests, we need to be able to measure them across all age groups from childhood to old age. Current inventories are not usually used with children because of their unreliability with the age group. Perhaps reliability is not a goal in this type of study if it can be shown to be related to change in the subjects and not in their reading level, understanding of the items, or in testing conditions.

The problem of designing and standardizing instruments which can be used to make comparisons across age is technically challenging. One easily understood inventory of moderate length, or a series of inventories with

a core of common items to be used with groups increasing in age might be developed. A study by Harmon (1971) would suggest the latter as an appropriate approach.

The problem of designing instruments for cross cultural comparisons is equally interesting.

One of the major problems in studying developmental trends descriptively, which is ethically palatable, is that the best description is derived from longitudinal research. Once a longitudinal study is completed there remains the question of applicability to the here and now and to the future. Experimental studies have the virtue of shedding light on the development of interests more rapidly but are not as acceptable ethically.

Contributions and Applications Expected

The ability to shape a person's interests in the service of both the individual and society is valuable if it is handled benevolently. The rewards of individual satisfaction and social approval which could stem from a good fit between supply and demand in the job market are desirable.

For example, the current oversupply of teachers was predictable several years ago, but students went ahead with their plans to obtain teaching credentials. How much better the situation might be if we knew how to help them redirect their energies to other satisfactory occupations. Better measurement, and greater understanding of the development of vocational interests, can help reach the goal of better social planning for the whole country.

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Figure 1). These can be administered individually or in groups. To compare these various methods, the counseling must be standardized. One way to do this is to assign tests before the first counseling interview, then to follow this with a test interpretation session. Next, a questionnaire (the criterion measure) assessing its effectiveness could be administered, followed by counseling. This limited design may be relatively tight experimentally, but does not allow study of the relationship of test interpretation to counseling. As test interpretation is integrated into the counseling session, and as these sessions become more complex, the process of counseling may be more meaningful to the client, but extraneous variables will be more difficult to control.

Methods of Test Interpretation

The most common means of communicating test results to a client is through the explanation of a test profile. The client and counselor look at a profile and discuss its meaning. The counselor explains terms such as percentile and shaded area. He may also discuss the reason that the test is being used, perhaps how it was constructed, and, most important, its relevance to the client. This, like all other methods, can be used with groups of clients or individuals.

Another method is that of programmed instruction which can be used in the actual counseling session or can be given to a student as preparation for a session. Wilkerson (1967) and Forster (1969) have found programmed instruction to be more helpful in some ways than standard group or individual interpretation of profiles. However, Seaquist (1971) found no essential differences between these methods. One main advantage of a programmed presentation is that it guarantees that the client knows the facts which the

developer of the programmed instructions thinks are important. Furthermore, the programmed instructions are identical for each participant. Thus, this method of test interpretation provides a suitably controlled variable for research.

Presentations of interpretive materials on audio or video tape are being developed, but there is no data describing their effectiveness. Zytowski (1972) has produced an audio tape for experimental purposes for the KOIS, consisting of several students discussing the KOIS with a counselor who explains and answers questions students might have about it. After listening to this tape, a client should have a good understanding of the purpose and limits of the KOIS. Sharf (1970) has prepared a slide show and video taped interpretation of the SVIB, designed primarily for group presentations.

All of these methods have merit from an experimental point of view because the stimulus (test presentation) will be identical for each group or individual.

A method differing from the previous three employs a computerized narrative report of an individual's test scores, rather than a profile. Helm and Harasymiw (1968) have produced such reports for the preliminary Scholastic Aptitude Test, and Sharf (1971) has designed one for the SVIB. Investigating the effectiveness of narrative reports, Rules (1972) found that students receiving programmed instruction for interpretation of the SVIB did not differ significantly in retention of information about the SVIB from those who received a computerized report. These reports, however, have several advantages which profiles lack. Unlike profiles, they avoid confusion over the meaning of technical terms and numerical scores by

explanation and/or deletion of such terms. In addition, a computerized report form can yield information to aid the student in synthesizing information on the report. For example, on Sharf's (1971) computerized report, if a student has high interest in a particular occupational category, she is given a list of related occupations to consider. Another feature of a computerized description is that the information from two or more interest inventories can be integrated into a meaningful report, as is being done with the Opinion, Attitude, and Interest Survey (OAIS) and the SVIB (Sharf, 1970). Finally, a standard and reproducible stimulus for research can be made for each individual through use of a computer. Counselors interpreting a profile rarely can explain it the same way to each client, but a computer is consistent.

Criteria for Effectiveness of Interpretation

The problem of choosing effective criteria is very difficult, as all criteria are subject to criticism. Using a test of knowledge about the information presented to the student does not tell what the student will do with that information. A checklist of vocational exploratory behaviors is a good method of examining the effectiveness of vocational counseling (Krumboltz, 1965), but does not give direct information about the value of a method of test interpretation *per se*. The same criticism can be made of measures of self-concept and self-worth. Employing appropriate or realistic job choice as a criterion is also difficult; how can a realistic vocational choice be accurately determined for an individual? Although Crites (1969) has outlined a method for categorizing types of vocational choice, such criteria may be too broad to evaluate a portion of the counseling process as specific as test interpretation. Certainly, transactions between client

and counselor which do not concern test results are important in choosing a vocation. Many of the criteria listed above may be appropriately combined in researching effectiveness of test results. However, the investigator must consider the problems of interdependence of evaluation instruments when using multiple criteria. When using several highly related evaluation measures, there is a danger of overinterpreting the significance of the data.

Conclusion

In the past, test publishers have not encouraged experimentation with different types of profiles or reports. Due to the high cost of producing several types of profiles, little research on developing new types of profiles exists. If the test publishers cannot finance this research, then the investigator must. There is no reason that research in test interpretation should be limited to the standard profile provided by publishers.

One of the last bastions of professionalism among counselors and psychologists is test interpretation. Generally, paraprofessionals are assumed not to be sophisticated enough about measurement to interpret tests. A very important study that has yet to be done would test this hypothesis: counseling psychologists and guidance counselors are more competent in interpretation of tests than non-professionals (e.g., dormitory directors, resident hall assistants, classroom teachers).

Professors of measurement have been concerned about helping their students to become more sophisticated in the use of statistical tools. Perhaps it is now time to make reliance on these tools less necessary, so that test results can be used by more people. With technological advances in the use of taped presentations and computerized reports, this is now

possible. Research into this topic and those which are illustrated in Figure 1 is a starting point in developing and investigating new dimensions in counseling.

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IV. Interests and Vocational Guidance

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This paper was conceived as an attempt to review parts of the research on interests and their relation to vocational guidance, a difficult task because of the magnitude of studies involving interests, and the lack of any recent theoretical statement with which to organize their findings. Buros' 7th Mental Measurement Yearbook (1972) reveals approximately one thousand studies performed on the Strong Vocational Interest Blank or the Kuder Preference Records since the last review and partial formulation of theoretical principles by Super & Crites (1962). A comprehensive review of this much research production would be entirely beyond the scope of this paper, so highlights of selected areas follow.

The Theory of Interests

The most recent commentators on interests were active in the 50's and early 60's: Darley and Hagenah (1955), Hahn and MacLean (1955), Layton (1960), and Super and Crites (1962). A careful reading of their books suggests that there is general agreement on something like the following principles:

1. That interests develop from early age and attain a stability of sorts at about the age of 20 to 25.
2. That interests are related in some way to personality and other variables in the affective domain.
3. That persons in the same occupations can be demonstrated to have or to report that they have similar interests.

4. That scores on interest inventories tend to forecast the kinds of occupations young persons eventually populate.

But, in the past ten years there has been little clarification and further specification of theoretical constructs. For instance, Hahn & MacLean (1955) state:

> "Interests are an aspect of personality shaped by both heredity and environmental factors."

Super & Crites (1962) elaborate on this point:

> "Some of the things a person does well as a result of his aptitudes bring him the satisfaction of mastery or approval of companions, and result in interests. . . . His needs and modes of adjustment may cause him to seek certain satisfactions but the means of achieving these satisfactions vary so much from one person with one set of aptitudes and in one set of circumstances, to another person with other abilities and in another situation, that predication of interest patterns from needs and modes of adjustment is hardly possible."

The Genesis of Interests

The genesis of interest patterns or interests themselves is a topic which has attracted many investigators. Darley & Hagenah (1955) review the literature in an attempt to add to Fryer's (1931) idea that abilities spawn interests, but are unable to produce any postulate to this effect. But interests, or at least liking and disliking have been shown to arise from success and failure in the performance of a task (Locke, 1965; 1967). Experimental methodology, such as Locke used, is rare in the study of interests, but would seem promising in the development of theoretical constructs.

Evidence has been offered that interests are to some degree heritable (Vandenberg & Stafford, 1967), or that similarities occur between the generations within families (Mussen, 1961). Other factors, such as socio-economic status, sex, geography, and experiences, have all been examined for their relationship to interests, but after 15 pages of discussion devoted to the topic, Super & Crites (1962) conclude only that a theory must recognize the possibility of multiple causation.

An interesting hypothesis, contrasting with the point of view illustrated by the foregoing, is that of Bordin (1943), to the effect that interests are expressed to conform with the particular role a person chooses for himself, and that as circumstances dictate a change in role, there will be a corresponding change in interests. Data to support the matter of change has been advanced by Bordin & Wilson (1953), but nothing further has been achieved, except an endorsement of the idea by Tyler (1960). Of course, it is appropriate to ask what "causes" a person to adopt a particular role, and the catalogue must inevitably include all the factors thought to be the sources of interests.

A great many references listed for interest inventories investigate the possibility that interests are related to, if not virtually caused by, personality traits. The studies vary in sophistication from simple correlational studies of one personality variable with all the scales of an inventory (Zytowski, 1967), to complex multivariate procedures, such as canonical correlation (Thorndike, Weiss, & Dawis, 1968). No comprehensive review of these studies, such as Ghiselli's (1966) review of ability tests has been undertaken.

Definitions

Noticeably absent from any of the reviews and theories is a generally accepted set of definitions of interests, especially one which differentiates them from other parts of the affective domain, such as attitudes, values, and the like. Super's (1949) typology, which is often advanced as a definition, actually speaks only of methods of measurement: expressed, observed, inventoried, and tested.

Other matters could be included here: the relationship between likes and dislikes on the one hand, and preferences on the other (have interests absolute scaling properties, or are they merely ordinal?), interests in objects (I like algebra) versus interest in process (I like to participate in active sports), and the relationship between vocational and avocational interests.

As a corollary, we know little about the variability in the bandwidth of liking and disliking. Individual differences can be observed--the Strong Vocational Interest Blank reports the percentages of each response to the first 100 items, all occupations, as well as liking for items which are psychometrically diverse and unrelated. But we do not know whether liking just a few things or everything, or many diverse things has any implications for our theoretical considerations of interests.

Stability of Interests

A useful stability of interests has been demonstrated; they appear to gain a relative constancy between the ages of 20 to 25. Or, if one accepts Bordin (1943), at this time persons accept a work role in which they remain for some time, and interests cease to change.

What is more, the interest patterns of persons in certain occupations appear to be relatively constant. Campbell (1971) reviews the evidence that for bankers, ministers, school superintendents, and company presidents, interests remain constant over a span of 30 years. However, Campbell has also shown (1971) that certain types of interests are experiencing a drift in base-rate popularity for men and women since they were first included in Strong's original interest blank. It is a complex change, Campbell says, but he describes it as a movement away from hands-on and outdoor interests to interpersonal, outgoing or extroverted activities.

What has not been investigated is change in interests which might accompany change in occupation--Bordin and Wilson's (1953) study was only of change in college curriculum. Mid-career changes in occupational field are seen by counselors; do interests change accordingly? Further, what happens to liking and disliking responses compared to preference responses when a person is unable to continue doing the work he has done as a result of disability or aging? Can interests remain strong, yet unsatisfied? A related question would ask whether interests are subject to satiation effects, as might be assumed from observation of the effects of appetitive drives such as hunger. That is, could there be any parallel phenomenon in interests as that experienced by the person when he is offered a 99th pancake compared to when he is offered the first?

The Validities of Interests

A generous portion of the research on interests is devoted to determinants and the development of interests. An equally large part is devoted to consideration of the relationship of interest to real life events. Of interest here are studies of the concurrent and predictive validities of interests

to criteria of occupational membership, occupational success or performance, and job satisfaction. The last extensive treatment of this topic was by Berdie (1960).

Only a glance at the reference lists in Buros (1972) is needed to establish that many studies have demonstrated the concurrent validity of interest measures to various groups. Title after title consists of "The interests of . . ." followed by such diverse groups as mental patients, over- and under-achievers, medical students, USAF Officers, in-service and pre-service elementary, secondary, and college teachers, and the like. It may be concluded from these that groups of many diverse descriptions may be differentiated in terms of their inventoried interests, but it would seem that some further principles could be drawn if the findings were studied more comprehensively.

The same differentiation between groups on a predictive basis has been established, and serves as the foundation for the Strong Blank and those inventories which operate on the same normative principle, such as the Minnesota Vocational Interest Inventory and the Kuder Occupational Interest Survey. That is, scores on interest inventories obtained around the age of 21 tend to predict with reasonably good efficiency what occupation or occupational group the person will be engaged in later in his life. The point of uncertainty presently is over the degree of predictability: Campbell (1971) has repeatedly found the chances are 3.5 to 1 that a person with an A or B+ (high) score on the Strong Blank will be found in a related occupation after an interval of years. Dolliver (1969a) has challenged this as an appropriate expression of the probabilities. Some comparisons of the relative validity of interest inventories with expressed interests have been

made by Dolliver (1969b) and Whitney (1969). Both conclude that little in additional validity is gained by the lengthy and costly process of inventorying compared to the quick and inexpensive expressed choice. Of course, the conclusion can only apply when a person has an expressed choice, and it is known that many young persons express uncertainty at various points in their vocational development.

Aside from occupational membership, the predictive validity of interests for success and satisfaction has been investigated. The conclusions are unclear for both criteria. It has been shown (Campbell, 1971) that success in certain occupations (most notably life insurance sales) is related to scores on the corresponding interests scales, but that it does not hold equally for a wide range of occupations. For instance, Knauft (1951) and Nash (1966) could not find an occupational scale which would predict success of managerial personnel, but could compile a group of interest items which reliably distinguished between successful and less successful managers.

Kuder devotes a portion of the manual for Form E (1964) of his Preference Record to the assertion that interests predict job satisfaction. His main support comes from two studies which related occupational membership to scores on Kuder interest scales obtained a number of years prior to entry. Persons were identified as having interests consistent or inconsistent with their occupation, and the frequencies of job satisfaction and dissatisfaction were obtained for each. The results are strikingly in support of greater job satisfaction where interests and occupations are consistent.

In contrast, Lewis & MacKinney (1961) found that engineering scale scores on the Strong Blank did not predict the job satisfaction of persons who became engineers. Berdie (1960) reviewed more studies of this kind

and found that the relationship could be demonstrated when interests were inventoried concurrently, but not when the inventory was administered at a time prior to entry into an occupation. It might be noted though, that predictive validity was not found for the Strong Blank with its normative scales, while it was found for the Kuder honogeneous scales. This is a matter which merits further study.

Interest Measurement Technology

Despite the impressive development of a technology of interest measurement represented by the many revised and new inventories (Zytowski, 1973), many problems still exist.

Especially now, the problem of base-rate popularity differences in items for men and women, and how it affects norming and interpretation is important. Without such differences for occupational groups, normative measurement could not exist, but it is a nuisance when sex or ethnic group differences interact with those of occupational groups.

Related to this issue is the norming of homogeneous (and usually ipsative) scales. For instance, one inventory rank orders its scales in terms of the person's raw scores, but adds normalized scores on the basis of like-aged persons of same sex. In effect, this converts likes and dislikes obtained under absolute conditions to a preference list, further modified by information about how popular in general each scale is. Just how the person does or ought to respond to the information in these varied forms is not specified, and perhaps not even known.

Fakability or transparency of interests is another issue which is not resolved. In general, it is accepted that homogeneous inventories may be consciously distorted more easily than normative ones, and that certain scales

on normative inventories are more fakable than others. Campbell (1971) has reviewed the extensive literature on this matter and has concluded that it is not a matter "to be especially paranoid about." Kuder (1964) has produced a scale which detects insincere or careless respondents, which while not faking, is a problem to the more transparent inventory. Similarly, the effects of response sets such as liking and disliking or social desirability have been shown to have varying influences on occupational scale scores (Zytowski & Walsh, 1967).

Finally, for normative inventories the matter of representing similarity is a problem with no certain solution at the present time. The Strong Blank and the Minnesota Vocational Inventory have used a T-score within a specified normative group. While it is meaningful to report to a person that his interests fall within the range of persons in a given occupation, it is conceptually difficult to reconcile a T-score of 30 with one of 80. What does it mean to be more like a physician than the average physician is? Another inventory makes use of a unique index derived from the technique of correlation. Again, it must be asked, what does it mean to be highly correlated with some set of hypothetically perfect interests? And yet another inventory which compares the person with an occupational group on a set of 20 scale scores uses the D^2 index with all the attendant problems of any index of profile similarity. These are problems which it is felt merit further attention.

Conclusions and Recommendations

Aside from the conclusions which are evident in many of the sections of the foregoing discussion, it seems that one over-riding conclusion emerges: we have not had a comprehensive review of the field since Layton (1960), and

we need it badly. For one thing, the number of studies to be included in such a review is accelerating in a way that makes the possibility increasingly dim. For another, without such a review we do not know what we have succeeded with that we continue to replicate, and what we have not done adequately that needs more effort. Further, as has been noted, the field lacks a theoretical base, which could be a logical outcome of a comprehensive review. Measurement technology, while not without its own problems, has outstripped theoretical development; it is time for the latter to be caught up.

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APPENDIX

Outline for PEM Study Adopted for Planning Purposes

(Detailed changes have been made by Task Groups at the discretion of group members.)

1000. PEM Aspects of Child Development

1100. Special Problems in Infancy and Early Childhood (birth to 5 years)

1101. Group care
- 1. Effects of orphanage rearing, multiple mothering vs one-to-one mother-child (or surrogate mother) relations
- 2. Related effects of environmental complexity

1102. Separation anxiety: fear of the strange

1103. Readiness
- 1. General concept
- 2. Special application to disadvantaged children

1104. Forced training ("pushing")
- 1. In relation to "natural" intellectual limits
- 2. In relation to readiness

1105. Sequential organization of learning
- 1. In infancy
- 2. In early childhood

1106. Parental involvement and influence on early development
- 1. Effects of home environment, of implicit theories and practices of parents
- 2. Manipulation of parental beliefs and practices, in enrichment programs

1107. Modes of learning and experience that affect early behavioral development
- 1. Differential effects on anatomical maturation and behavioral development
- 2. Correspondence between rates of anatomical and behavioral development
- 3. Effects of environmental (experiential) enrichment and impoverishment, and cumulative effects with increasingly complex circumstances
- 4. Hierarchical conceptions of intellectual development (Piaget)
- 5. Development of learning sets and their implications for intellectual, motivational, and personality development; resistance of resultant behaviors to extinction
- 6. Critical periods

1200. Child Socialization

1201. Conceptualization of the socialization process
- 1. Socialization pressures
- 2. Learning paradigms: e.g., dependency relations and adult control of "effects" (reinforcement), reference group formation

1202. Internalization of beliefs and values
    1. Conceptualization of attitude, belief, and value systems
    2. Identification processes
    3. Impulse control (self control)
    4. Effects of environmental resources
1203. Cognitive socialization
    1. Psycholinguistic structures, language development: effects on thought, beliefs, attitudes, interests; patterns of expression, values
    2. Uncertainty and information-seeking
    3. Development of expectancies; category accessibility; assimilation; effects on perception, cognition, action
    4. Symbolism, symbolic behavior

1300. Personality Development
1301. Developmental theories (Freud, Erikson, Piaget, Sears)
1302. Developmental sequences, stages
    1. Critical periods
    2. Fluid and crystallized patterns of intelligence (Cattell)
1303. Development of self-identity
    1. Self concept, ego theories, self theories
    2. Relations to social class, racial-ethnic factors, region, sex, family characteristics
1304. Effects of age, sex, culture, and other environmental factors
1305. Development of mechanisms of coping and adaptation

1400. Behavior Change
1401. Personality, learning
1402. Susceptibility to change of personality traits, attitudes, interests, beliefs, values
1403. Measurement of change
1404. Genetic, maturation, and learning factors in physical and psychological growth

2000. Personality

2100. Conceptual and Theoretical Approaches
2101. Criteria for a viable theory
2102. Development of unified, integrated theoretical formulations
    1. Cross-level comparisons and correlations
    2. Developmental histories of stable traits
    3. Relations among trait patterns at various developmental levels
    4. Relations of traits to perceptual responses in person perception and interpersonal interaction

2200. Cognitive Conceptions

2201. Cognitive style, complexity
2202. Balance theories
2203. Cybernetic formulations
    1. Computer simulation of personality
    2. Mathematical models

2300. Developmental Approaches (see 1300)

2400. Dynamic Approaches (see 1303, 4000)

2500. Morphologic Approaches

2600. Physiologic, Psychophysiological, and Biochemical Approaches (see 2102.1)

2700. Trait Structure, Multivariate Approach - Taxonomy of Trait-Explanatory Concepts of Stylistic and Temperament Aspects of Personality
2701. Methodological problems: definition of universes of behaviors for self-report, observation-rating, and objective test studies, cross-media matching of stable structures, design paradigms, including multi-modality designs and trait x treatment designs; construct validation of traits; effects of age, sex, sample, culture, and other environmental effects, and relations of these to resulting trait patterns; the range of roles and sets in relation to diversity of response patterns obtained (social desirability, acquiescence, and other specific sets), their similarities in terms of effects on self-description, and the relations of traits to moderator variables representing such sets
2702. Observational, rating methods: rater and "ratee" sources of effects in peer and "other" ratings, in observational trait assessment, and in interpersonal interaction; explicit concern with task, stimulus presentation, response format, socio-environmental setting, and demographic characteristics of participants; conceptual and empirical relationships among similar and related trait descriptors within observational-rating subdomain and in other subdomains (self-report)
2703. Self-report methods: item pools; format; item vs cluster factorization; measurement of and correction for response bias or distortion; development of a unified, consistent conceptual framework for concepts of personality style and temperament
2704. Objective test, misperceptive, indirect assessment, and development of fresh, new approaches to personality measurement and description

2800. Creativity
2801. Conceptualization of creativity; relations to intelligence, personality factors

2802. Characteristics of the creative person
2803. Analysis of the creative process
2804. Characteristics of the creative product
2805. Characteristics of the creative situation, short- and long-term; situational factors contributing to creative performance
2806. Measurement of creativity

3000. Emotions

3100. State Patterns: Physiological, Cognitive, Behavioral
3101. Arousal stimuli
3102. Response dimensions
3103. Uniqueness
3104. Learned-unlearned dimensions
3105. Affective learning; autonomic and physiological learning

3200. Relations to Traits, Roles

3300. Moderation of Expression by Learning
1. Culture patterns
2. Age, sex, group norms

3400. Drug Effects on Emotional Patterns

3500. Differentiation of States, Reflecting Situational, Organismic, and Stimulus Variations, from Traits, Represented as Long-Term Individual Dispositions

3600. Arousal States: Adrenergic Response, Stress

3700. Dysphoric States: Anxiety, Depression, Guilt, Shame, Remorse (see 4300)

3800. Duphoric States: Happiness, Elation, Joy, Hope, Confidence

4000. Motivation

4100. Conceptualization and Theory (human motivation)
4101. Homeostatic systems, physiological need
4102. Need-press system (Murray), subsystems (n Ach)
4103. Dynamic systems (Freud, Cattell)
4104. Cognitive and cybernetic approaches: motivation inherent in information-processing functions (Hunt), cognitive dissonance theory, incongruity, collative variables (Berlyne), balance theories, exchange theory
4105. Motivation inherent in individual performance, competence motivation (White)
4106. Trait systems and patterns (Guilford, Cattell)
4107. Values systems, moral character
4108. Conceptualization of interest, attitude, need, belief, value, ideal

4200. Process and Trait Formulations
4201. Relations and differences in conception and approach
4202. Process theories and formulations
    1. Balance theories
    2. Exchange theory
4203. Trait formulations: motives, values, character traits
    1. Methodology of measurement: Strong paradigm, Thurstone scales, Likert scales, Cattell's and Campbell's indirect approaches: self-report, objective, misperception, observation, rating, content analysis, unobtrusive measures
    2. Analytic approaches: factor analysis, multidimensional scaling, profile clustering
    3. Factored patterns of sentiments, attitudes, interests, beliefs, values
    4. Variations related to age, sex, sample, culture, and other environmental factors

4300. Frustration, Stress, and Anxiety
4301. Frustration theory and research evidence
4302. Conceptualization of stress
    1. Relation to frustration (Selye)
    2. Utility of stress concept in interpretation of behavior
    3. Relationships among physiological and psychological aspects
    4. Stress and coping, adaptation
4303. Adaptation-Level Theory (Helson) (see 5100)

4400. Conflict
4401. Conceptualization of conflict (Miller, Murphy, Cattell)
    1. Types of conflict: role, value, internal
    2. Approach and avoidance relations
4402. Conflict measurement and calculus
4403. Conflict in relation to interpretation and prediction of action

4500. Interests and Vocational Guidance
4501. Incremental value of interest measurement over ability and aptitude measures in predictions of various criteria on various populations (Thorndike, 10,000 Occupations; Clark, Minnesota study)

5000. Environmental Variables

5100. Conceptualization of Environmental Variables and Their Effects on Behavior; Human Ecology

5200. Methodologies for Encoding Environmental Factors

5300. Taxonomic Systems of Environmental Variables

5400. Normative Studies of Selected Behaviors in Relation to Defined Patterns of Environmental Setting: Sampling Problems in Relation to Populations, Behaviors, Macro- and Micro-Environmental Settings

6000. Interpersonal Behavior Processes

6100. Group Theory, Role Theory, Interpersonal Settings

6200. Interpersonal Perception, Attraction, Influence; Social Acuity, Empathy

7000. Variations in Psychological Processes

7100. Paradigms for such Research, Taking Account of Persons, Tasks, Environmental Settings, and Occasions (Cattell covariation chart, Campbell-Fiske model, longitudinal replication)

7200. Paradigmatic Studies of Selected Learning, Motivation, Perception, and Other Psychological Processes to Investigate Variations Attributable to Shifts in Subject, Task, Setting, and Occasion Dimensions

7201. Analyses to estimate magnitudes of variance components in standard dependent variables accounted for by trait, treatment, and trait by treatment sources and their specific constituents

7202. Analysis of total interaction parameter estimates into principal components or other dimensions in order to compare results by such methods with conventional R, P, Q analysis, both with single dependent variables and vectors (multiple dependent variables)